In the Claims

CLAIMS

1. (Currently Amended) A plasma enhanced chemical vapor deposition method comprising:

placing a substrate within a plasma enhanced chemical vapor deposition reactor;

providing a plurality of reactant gases within the reactor proximate the substrate under high density plasma conditions effective to form a layer on the substrate, the conditions resulting in etching of portions of the layer during its formation and thereby including a deposition to etch ratio of the forming layer; ~~and~~

changing the conditions during the forming to change the deposition to etch ratio; and

wherein the changing of the conditions reduces the deposition to etch ratio at least once during formation and subsequently increases the deposition to etch ratio during formation.

2. (Original) The method of claim 1 wherein changing the conditions comprises changing a flow rate of at least one reactant gas to the reactor during formation.

3. (Original) The method of claim 1 wherein changing the conditions comprises changing at least one power setting during formation.

4. (Original) The method of claim 1 wherein changing the conditions comprises changing a flow rate of at least one reactant gas to the reactor and changing at least one power setting during formation.

5. (Original) The method of claim 1 wherein changing the conditions comprises:

beginning with an environment providing a large deposition rate relative an etch rate;

after the beginning, decreasing the ratio; and

after decreasing the ratio, increasing the ratio.

6. (Original) The method of claim 1 wherein changing the conditions comprises changing at least one of bias power on the substrate and flow rate of at least one reactant gas into the reactor during formation.

7. (Original) The method of claim 1 wherein changing the conditions comprises maintaining constant power settings while changing a flow rate of at least one reactant gas into the reactor during formation.

8. (Original) The method of claim 1 wherein the layer comprises a predominate SiO_2 comprising layer and deposition starts with substantially no etching of the SiO_2 layer during its initial formation.

Claims 9 and 10 (Cancelled).

11. (Original) A plasma enhanced chemical vapor deposition method comprising:

placing a substrate within a plasma enhanced chemical vapor deposition reactor;

providing a plurality of precursor gases within the reactor proximate the substrate under high density plasma conditions effective to form a layer on the substrate, the conditions resulting in etching of portions of the layer during its formation and thereby including a deposition to etch ratio of the forming layer; and

changing the conditions during the forming to continuously vary the deposition to etch ratio throughout at least a majority of the forming.

12. (Original) The method of claim 11 wherein changing the conditions comprises continuously increasing the deposition to etch ratio at some point after a majority of the layer has been formed.

13. (Original) The method of claim 11 wherein changing the conditions comprises:

beginning with an environment providing a large deposition rate relative an etch rate;

after the beginning, decreasing the ratio;

after decreasing the ratio, increasing the ratio.

14. (Original) The method of claim 11 wherein changing the conditions comprises varying a flow rate of at least one precursor gas to the reactor during formation.

15. (Original) The method of claim 11 wherein changing the conditions comprises maintaining constant power settings during formation.

16. (Currently Amended) A semiconductor processing method of forming shallow trench isolation regions within a semiconductive substrate comprising:

forming isolation trenches within a semiconductive substrate;

providing the substrate with trenches within a plasma enhanced chemical vapor deposition reactor;

injecting at least a silane containing gas, an oxygen containing gas and an inert gas into the reactor under high density plasma conditions effective to form a predominate SiO_2 comprising layer on the substrate to overfill the trenches, the conditions resulting in etching of portions of the layer during its formation and thereby including a deposition to etch ratio of the forming SiO_2 comprising layer; ~~and~~

changing the conditions during the forming to change the deposition to etch ratio; and

wherein changing the conditions comprises substantially eliminating etching while continuing the deposition.

17. (Original) The method of claim 16 wherein changing the conditions comprise starting with a high deposition rate as compared to any etch rate, following with a reducing deposition to etch ratio and then following with an increasing deposition to etch ratio.

18. (Original) The method of claim 16 wherein changing the conditions comprises changing a flow rate of at least one of the silane containing gas, oxygen containing gas and inert gas.

19. (Original) The method of claim 16 wherein changing the conditions comprises changing a flow rate of the silane containing gas during formation.

20. (Original) The method of claim 16 wherein changing the conditions further comprises varying a bias power on the substrate during formation.

Claim 21 (Cancelled).

22. (Original) The method of claim 16 wherein the deposition starts with substantially no etching of the SiO_2 layer during its initial formation.

23. (Original) A plasma enhanced chemical vapor deposition method comprising:

placing a substrate within a plasma enhanced chemical vapor deposition reactor;

providing a plurality of reactant gases within the reactor proximate the substrate under plasma conditions effective to form a substantially homogeneous layer of material on the substrate; and

reducing a flow of at least one of the reactant gases during at least some of the forming and continuing forming the layer.

24. (Original) The method of claim 23 wherein the plasma conditions comprise etching conditions thereby providing an etch of the layer during at least some of its formation.

25. (Original) The method of claim 23 wherein at some point in time after the deposition begins, the etching increases relative to the deposition.

26. (Original) The method of claim 23 comprising maintaining substantially constant power settings during formation.

27. (Original) A plasma enhanced chemical vapor deposition method of forming a SiO_2 comprising layer on a semiconductor substrate, comprising:

placing a substrate within a plasma enhanced chemical vapor deposition reactor;

injecting at least a silane containing gas, an oxygen containing gas and an inert gas into the reactor under high density plasma conditions effective to form a predominate SiO_2 comprising layer on the substrate; and

reducing a flow of at least one of the silane containing gas and the oxygen containing gas during the forming and continuing forming the layer.

28. (Original) The method of claim 27 wherein reducing a flow comprises the silane containing gas.

29. (Original) The method of claim 27 wherein reducing a flow comprises the oxygen containing gas.

30. (Original) The method of claim 27 wherein reducing a flow comprises the silane containing gas and oxygen containing gas.

31. (New) The method of claim 1 wherein the changing of the conditions comprises providing the changing simultaneously with the forming of the layer.

32. (New) The method of claim 1 wherein the forming of the layer comprises forming a single layer.

33. (New) The method of claim 1 wherein the forming of the layer comprises uninterrupted forming during the changing of the conditions.

34. (New) The method of claim 16 wherein the changing of the conditions comprises providing the changing simultaneously with the forming of the predominate SiO_2 comprising layer.

35. (New) The method of claim 16 wherein the forming of the predominate SiO_2 comprising layer comprises forming a single layer.

36. (New) The method of claim 16 wherein the forming of the predominate SiO_2 comprising layer comprises uninterrupted forming during the changing of the conditions.

37. (New) A plasma enhanced chemical vapor deposition method comprising:

placing a substrate within a plasma enhanced chemical vapor deposition reactor;

providing a plurality of reactant gases within the reactor proximate the substrate under high density plasma conditions effective to form a layer on the substrate, the conditions resulting in etching of portions of the layer during its formation and thereby including a deposition to etch ratio of the forming layer;

changing the conditions during the forming to change the deposition to etch ratio; and

wherein changing the conditions comprises:

beginning with an environment providing a large deposition rate relative an etch rate;

after the beginning, decreasing the ratio; and

after decreasing the ratio, increasing the ratio.

38. (New) A semiconductor processing method of forming shallow trench isolation regions within a semiconductive substrate comprising:

forming isolation trenches within a semiconductive substrate;

providing the substrate with trenches within a plasma enhanced chemical vapor deposition reactor;

injecting at least a silane containing gas, an oxygen containing gas and an inert gas into the reactor under high density plasma conditions effective to form a predominate SiO_2 comprising layer on the substrate to overfill the trenches, the conditions resulting in etching of portions of the layer during its formation and thereby including a deposition to etch ratio of the forming SiO_2 comprising layer;

changing the conditions during the forming to change the deposition to etch ratio; and

wherein changing the conditions comprise starting with a high deposition rate as compared to any etch rate, following with a reducing deposition to etch ratio and then following with an increasing deposition to etch ratio.